upon the non-allowability of a generic linking claim, Applicant is entitled to retain in the case claims to the non-elected invention. If the generic linking claim is allowed, the Examiner must then examine non-elected claims to species falling within the genus. MPEP 809.04.

The invention

In one aspect, the present application provides, for the first time, identification of a family of calcium-activated potassium channels. This family is called the "SK" family, for small conductance potassium channels, and includes three genes, SK1, SK2, and SK3. This family of channels is highly conserved (about 80-90% identity) over a core sequence of approximately 300 amino acids. Furthermore, this family of channels share functional characteristics, such as pharmacological properties (apamin sensitivity) and small conductance properties.

Rejection under 35 USC § 101

Claims 100-106 were rejected as allegedly lacking utility and enablement. Applicants respectfully request withdrawal of the rejection.

According to the MPEP, in order to assess utility, the Examiner should review the specification to determine if there are any statements asserting that the claimed invention is useful for any particular purpose. An invention has utility if the utility is specific, substantial and/or credible. A utility is specific if it is specific to the subject matter claimed. A utility is substantial if it has a real-world use. In most cases, an applicant's assertion of utility creates a presumption of utility that is sufficient to satisfy the utility requirement of 35 U.S.C. § 101. Furthermore, an Examiner cannot simply dismiss an assertion of a particular utility as wrong but must determine if the assertion is credible, i.e., would be believable to a person of ordinary skill in the art based on the totality of the evidence (see MPEP 2107.02).

A *prima facie* showing of lack of utility must establish that it is more likely than not that a person of ordinary skill in the art would not consider that any utility

asserted by the applicant would be specific and substantial. However, the present invention provides a specific utility, as it is directed to nucleic acids encoding SK2 potassium channels, which are biochemically and pharmacologically distinct from other members of the SK family. Furthermore, the present specification also demonstrates that one of skill in the art would reasonably believe that the claimed nucleic acids would be useful for assays for identifying SK2 potassium channel modulators, thereby conferring a substantial utility upon the invention. The credibility standard for the utility requirement is therefore also meet in the present application.

Applicants have disclosed in the present specification that the claimed SK2 nucleic acids, full length cDNAs, encode an SK2 potassium that is specifically expressed in, e.g., brain and adrenal gland, and have provided data demonstrating that the claimed SK2 potassium channel is involved in, e.g., modulation of afterhyperpolarization in neurons (AHP). As described in the present application, AHP is involved in seizure activity and learning and memory. Furthermore, SK2 channels are also expressed in peripheral cell types and is therefore involved in excitability of non-neuronal cells (e.g., lymphocytes, see, Jaeger *et al.*, FEBS Lett. 469:196-202 (2000)). The present invention is therefore useful, e.g., for screening for modulators of this SK2 potassium channel and for the identification of compounds involved in modulation of cellular, e.g., neuronal, excitability. Such compounds are useful for treating diseases related to seizure activity and learning and memory, as described above.

A "substantial utility" defines a "real world" use. Clearly, assaying for drugs involved in neuronal excitability is a real world use, thereby indicating that the SK2 modulator assays of this invention have a substantial as well as a specific utility. In addition, the utility of the claimed assays is credible. Based on the totality of the evidence, one of skill in the art would believe that the proteins of the assay are involved in cellular excitability, e.g., neuronal excitability. Therefore, the assays of the present invention are specific, substantial and credible and thus fulfill the requirements of 35 U.S.C. §101. Applicants respectfully request that the present rejection be withdrawn.

Rejection under 35 USC § 102(e)

The claims were rejected as allegedly anticipated under 35 USC § 102(e) by US Patent 6,165,719 to Chandy. The Examiner states that Chandy discloses a nucleic acid encoding a calcium activated potassium channel which is 72% or 88% identical to SEQ ID NO:19 of the present application. The Examiner also states that the cells with the nucleic acids encoding the proteins "inherently have the functional limitations because it is a calcium activated potassium channel." Applicants respectfully traverse.

Chandy is not a 102(e) reference for the present application

US Patent 6,165,719 to Chandy claims priority to USSN 60/052,556, filed July 15, 1997. Although Applicants have not reviewed the priority claim for the Chandy patent, the earliest priority date possible for the nucleic acid sequences disclosed in the patent is July 15, 1997. Applicants make no representation herein as to whether the Chandy sequences are supported by the priority claim to USSN 60/052,556 or are only entitled to the filing date of US Patent 6,165,719, filed July 15, 1998. In either case, Chandy is not available as 102(e) art for the present application.

The present application was filed on September 10, 1997 and claims priority to three provisional applications, USSN 60/026,451, filed September 11, 1996; USSN 60/040,052, filed March 7, 1997; and USSN 60/045,233, filed April 17, 1997.

The claims of the present application find support in USSN 60/026,451, filed September 11, 1996, which discloses rat SK2 nucleic acid and amino acid sequences (SEQ ID NOS:2 and 15). These rat SK2 sequences are encompassed by generic claim 100, as these sequences hybridize under the specified conditions to the referenced nucleic acid. Furthermore, the claims of the present application find support in USSN 60/040,052, filed March 7, 1997, which additionally discloses human SK2 nucleic acid and amino acid sequences (SEQ ID NOS:19 and 21). These human SK2 sequences are encompassed by generic claim 100, as these sequences hybridize under the specified conditions to the referenced nucleic acid (and in fact are identical to the referenced nucleic acid). USSN 60/026,451, filed April 17, 1997 also supports the present claims.

Applicants note that the earliest priority claim of the Chandy application is on July 15, 1997, well after the earliest priority claims of the present application (September 11, 1996 and March 7, 1997). Chandy is therefore not available as a 102(e) reference for the present application. Applicants respectfully request that the rejection be withdrawn.

The priority applications are enabling for the present claims

The Examiner also states, without providing any reasoning or explanation, that the "continuing application upon which priority is claimed fails to provide adequate support under 35 USC 112 for claims 100 and 102-106 of this application." Office Action, page 5. Applicants note that the present application claims priority to three provisional patent applications, as described above. Each of these applications provides fully enabling support for the hybridization conditions and reference sequences recited in the pending claims.

As identified in the Patent Office and the Federal Circuit, whether undue experimentation is required by one skilled in the art to practice to invention is determined by considering factors such as the amount of guidance presented in the application, the state of the prior art, and the presence of working examples. *Ex parte Forman*, 230 USPQ 546 (Bd. Pat. App. & Int. 1985); *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988). As described in *Wands*, a "considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which experimentation should precede." *Wands*, 8 USPQ2d at 1404 (quoting *In re Jackson*, 217 USPQ 804 (Bd. Pat. App. & Int. 1982).

The claims specify hybridization conditions, as well as conserved reference sequences to which the claimed nucleic acids must hybridize. Hybridization methods for the identification of nucleic acids are also are well known to those of skill in molecular biology, and are specifically disclosed in each application to which the present application claims priority (see, e.g, Example 1 of the present application and of each priority application). These elements therefore provide adequate guidance for routine

identification of the nucleic acids of the invention. In addition, claimed functional characteristics of the proteins encoded by the claimed nucleic acids would allow one of skill in the art to identify operable embodiments and exclude inoperable embodiments. Finally, Applicants clearly meet the PTO guidelines for enablement, which set forth the standard for the scope of enablement when a large number of possible embodiments exists.

The assertion of undue experimentation appears to be based on an assumption that enablement requires the description of each and every nucleic acid that could be covered in the invention. Such a requirement is not consistent with the patent laws. Indeed, it is well settled in the biotechnology art that routine screening of even large numbers of samples is not undue experimentation when a probability of success exists. *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988). Using the conditions set forth in the claims and specification (e.g., Example 1) and routine methodology, any competent laboratory technician in a molecular biology laboratory could isolate and prepare appropriate constructs, transform cells, and identify those nucleic acids that encode an SK2 potassium channel of the invention. As set forth in MPEP § 2164.08, a rejection for undue breadth is inappropriate where "one of skill could readily determine any one of the claimed embodiments." In the present case, one of skill, given the conserved amino acid and nucleotide sequences, and the specified hybridization conditions, could easily screen for other nucleic acid and protein molecules that fall within the scope of the claims. Thus, undue experimentation is not required to practice the claimed invention, and the priority applications fully support the pending claims. As such Applicants are entitled to the present priority claim for the full scope of the pending claims. Applicants therefore request that the rejection of the present application under 35 USC 102(e) over Chandy be withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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APPENDIX A
PENDING CLAIMS

100. (as filed) An isolated nucleic acid encoding a polypeptide monomer of an SK2 calcium-activated potassium channel, said monomer forming a potassium channel having a unit conductance of between 2 and 60 pS when the nucleic acid encoding the monomer is expressed in a *Xenopus* oocyte, wherein said nucleic acid selectively hybridizes under stringent conditions to a sequence of SEQ ID NO:21, wherein the hybridization reaction is incubated overnight at 37°C in a solution comprising 40% formamide, 1 M NaCl and 1% SDS, and washed at 55°C in a solution comprising 0.5x SSC.

101. (as filed) The isolated nucleic acid of claim 100, wherein said nucleic acid selectively hybridizes under stringent conditions to a sequence of SEQ ID NO:15, wherein the hybridization reaction is incubated overnight at 37°C in a solution comprising 40% formamide, 1 M NaCl and 1% SDS, and washed at 55°C in a solution comprising 0.5x SSC.

102. (as filed) The isolated nucleic acid of claim 100, wherein said nucleic acid encodes a protein having an amino acid sequence selected from the group consisting of SEQ ID NO:2 and SEQ ID NO:19.

103. (as filed) The isolated nucleic acid of claim 100, wherein said nucleic acid has a nucleotide sequence selected from the group consisting of SEQ ID NO:15 and SEQ ID NO:21.

104. (as filed) An expression vector comprising a nucleic acid of claim 100.

105. (as filed) A host cell transfected with the vector of claim 104.

106. (as filed) A method of making an SK2 calcium-activated potassium channel protein, comprising culturing the host cell of claim 105 under conditions permitting expression of said nucleic acid encoding said channel protein.

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PTO FAX NO.: 1-703-308-0294

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Group Art Unit 1646

OFFICIAL COMMUNICATION FOR THE PERSONAL ATTENTION OF EXAMINER MICHAEL PAK

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that the following document(s)in re Application of John Adelman *et al.*, Application No. 09/254,590, filed May 24, 1999, for SMALL AND INTERMEDIATE CONDUCTANCE, CALCIUM-ACTIVATED CHANNELS AND USES THEREOF, are being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Document(s) Attached

1. As discussed by phone this afternoon, attached are copies of previously submitted documents sent to the U.S. PTO on January 2, 2003: Amendment (9 pp.); Transmittal PTO/SB/21, and PTO date-stamped return receipt postcard.

Number of pages being transmitted, including this page: 12

Dated: July 16, 2003

Annette S. Parent

Annette S. Parent, Reg. No. 42,058

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